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STRABISMUS.

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D. B. ST. JOHN ROOSA, M.D., LL.D.,  
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## FUNCTIONAL AND PARALYTIC STRABISMUS.

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ALTHOUGH our knowledge of the etiology of strabismus leaves much to be desired, it cannot be denied that we are making good progress in the successful treatment of this distressing deformity, and in a better understanding of its nature. It is now thoroughly settled, thanks to the pioneer work of Javal, and in spite of the doubts of certain authorities, that there is, at least, a small, and perhaps a large, proportion of cases in which the amblyopia, dependent upon incorrect position of the macula and disuse of the eyes, may be wholly or in part removed, and that in a certain contingent of cases, binocular single vision may be produced by treatment. The curative value of the exclusion of the better eye in strabismus, for the sake of exercising the amblyopic eye,<sup>1</sup> is again demonstrated by Dr. Derby's paper in the MEDICAL RECORD, and in several that have preceded it, especially that of Dr. A. E. Davis, read before the American Medical Association, in 1901,<sup>2</sup> and is of great importance. Although at one time sceptical as to the results to be obtained, I have had a few striking cases of this kind in my own practice, which have been fully reported. The importance also of attempting to cure the strabismus by treatment with glasses, before an operation is undertaken, has also been fully shown by the later writers, since Javal here also led the way. While the hopes as to cure, by means of securing paralysis of accommodation by the use of atropin, without complete correction of the refractive error, have not been realized, we

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have, by the proper correction of the astigmatism and hypermetropia, usually found in convergent strabismus, reduced the number of cases to be operated upon by quite a large percentage. Davis<sup>3</sup> thinks this is 30 per cent., and with this view I fully agree. The profession having an interest in ophthalmic science know, from my writings on the subject, that I believe we have already made a great advance in the kind of operation to be performed, and that I now invariably, for non-paralytic or functional strabismus, divide both the interni in convergent strabismus, and both externi in divergent strabismus, having stretched them, before the division is undertaken, according to the rules laid down by Panas, who first suggested and performed this operation.

It is not very long since the existence of any cases of amblyopia, as a result of the squint, was denied. The two cases of Dr. Walter B. Johnson<sup>4</sup> and of one of my own, the latter quoted by Javal in his monograph on Strabismus, prove that this is occasionally the case at any rate. Whether or not it is always so, perhaps remains an open question. It is my opinion that there is a certain proportion of cases in which the amblyopia precedes the strabismus, and is one of the factors producing it. This is certainly true of the strabismus often seen when one eye has been operated upon for cataract, while the other is left amblyopic. Again, a high degree of hypertropic corneal astigmatism, or a high degree of myopia in one eye, might be a cause of amblyopia at birth or during infancy. Some of the former scepticism was due, I think, to the fact that strabismus was in many quarters supposed to be an effect of the weakness of the muscles, and the origin was not sought beyond their action. Indeed, the muscles themselves are often examined as if they were the primal cause of strabismus. Func-

tional strabismus is no more caused by weakness of the muscles than is nystagmus. The old error of mistaking an effect for the cause is at the bottom of the erroneous theories about the origin of strabismus. Except in paralysis, the muscles are as strong in eyes affected with strabismus as they are in eyes in a proper state of parallelism. It is only the fixation power that is weakened or lost, and that is from what may be termed central causes. I am very far from denying that a muscle may become weaker after long disuse, or after it has been divided and haggled in an operation for convergent strabismus, so that the fibers are not again united. It may then have scarcely any power. We often see this in that form of divergent strabismus depending on a failure of an operation for convergent squint. After such a muscle is fished out and advanced and reattached, I have had occasion to see the growth of its fibers in cases where the operation was repeated a year after. But what I mean to affirm is, that in ordinary functional squint, the weakness and improper action of the muscles, whether it be more or less, is due entirely to the condition back of them which causes the strabismus. This is just as atrophy or shriveling of the muscles of one side of the body may occur as the result of a central lesion which prevents the muscles from action. It would be very absurd to speak of this condition as the primary cause of the inability to walk, or to use one side of the body, since that disability resulted as soon as the cerebral hemorrhage occurred, and is as great, if not greater, the moment after the hemorrhage which produced the hemiplegia, as it is when time has allowed the unused muscles to be lax and, perhaps, become atrophied.

To speak of monocular strabismus, excepting in paralytic cases, is a glaring fault in nomenclature. Among other evidences of the elementary state of

knowledge as to the nature of strabismus, is the fact that so much is said directly<sup>6</sup> and by inference, even to this day, of monocular strabismus, "of the eye which squints," and other terms to indicate that only one eye is at fault.

I long since<sup>6</sup> endeavored to show that all functional squint is concomitant, and I have repeated this observation in other places,<sup>7</sup> and that there is, consequently, no such thing as monolateral squint, where the muscle is not paralyzed. Yet, even men more or less expert in ophthalmology, in my clinic, often ask me as I am about to operate on a case of strabismus, "Which is the squinting eye?" Some of these inquirers really intend to ask, "Which is the eye that, as a rule, or generally, squints?"

Panas, proposing his new operation on both muscles at one sitting, said in his article: "The conception of the unilateral character of strabismus, while it is true of the paralytic variety, or that due to contraction of the muscle, is absolutely incorrect as to that which concerns concomitant strabismus," and he then gave the proper name of functional to concomitant strabismus.

Not many years since in the paper read before our State Medical Society, just quoted, I had occasion to speak of the scepticism in the minds of some of the experts in ophthalmology, as to the expediency of operating at all, or of giving very much special attention to strabismus. This scepticism was due, I believe, to the fact that strabismus had not then been everywhere thoroughly studied, as is now being done. It has given way, until all experts in ophthalmology no longer hesitate as to the proper treatment of strabismus; that is to say, in children, to first make an honest endeavor, by glasses and stereoscopic exercises, to cure the strabismus, and if this fails, in a few months, to resort to operation. In adults, or in inveterate

strabismus, or in children having poor fixation, it is proper and better to operate first and continue the treatment by glasses afterward. In the days when fear of too great an effect prevented us from dividing both interni at one sitting, Agnew was wont to remark that it was immaterial as to which eye was operated upon at the first sitting. He fully realized the bilateral character of functional squint. It is interesting to note that there never was so great a fear of dividing both externi for divergent squint at one sitting as was the case with the interni.

I objected to the word "concomitant" in the definition of strabismus, for all strabismus, with the exception of paralytic squint, is necessarily concomitant; that is to say, if one causes a patient with convergent or divergent squint to fix with the squinting eye, at the same time covering the one that is *usually* in a proper position, it immediately turns in or out, under the shade, according as the squint is convergent or divergent. It is much better, in my judgment, to adopt the names of "functional strabismus," and "paralytic strabismus," as suggested by Panas, to describe the two great varieties of strabismus. Of course, the latter form may be monolateral, but the former, in the very nature of things, cannot be. The important point to be noted in functional convergent or divergent squint is as to which is the eye with which fixation is usually made. Generally, if the refraction and vision of the two eyes are of about the same degree, although there are exceptions to the rule, the subject will alternately fix with one eye and then with the other, but where there is a great difference in the error, the fixation will be habitually with the eye having better vision. Finally, and sometimes very early, if the strabismus be uncorrected by glasses or operation, the deviating eye, as is well known,



in time loses in part or wholly the power of fixation.

An improper nomenclature often leads to misconceptions of the nature of an affection. It may prevent the adoption of better means of cure. Those who speak of "monolateral" squint are not only speaking against the facts of the case, but they are also preventing those whose knowledge, perhaps, is not so complete as their own from a full appreciation of the advantage of a bilateral operation for a bilateral affection. Great as was the work of Graefe in many departments of ophthalmology, that which he did in strabismus was not productive of good results. He was working on wrong lines, and he led men with less genius into error by his ideas that the squint could be better treated by what he called dosage of the operations—graduated tenotomy is a later term. This is not correct, and the theory was evidently based on the idea that a certain power of one externus or internus over that of the other was the fault that produced the strabismus. Even in Graefe's time it was the opinion of Donders that it is not the muscle that is at fault, except in paralysis, but fixed conditions of the eyeball, to which may be added, in exceptional cases, central disease.

In the interests then, of what I conceive to be scientific truth, I object to the use of the term, "monolateral strabismus," excepting as referring to the affection resulting from paralysis, as indicated above. While there may be an apparent monocular convergence or divergence of one eye in functional strabismus, it is always shown to be bilateral on the application of a simple test.

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